

Technical Deep Dive In **Web Assembly** for **Kong Gateway**

Caio Ramos Casimiro | Vik Gamov
Barcelona, Spain
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Agenda

What you'll learn

What are API Gateways

Why Kong

What is WasmX

What is Proxy-Wasm

How it all fits together
in the Kong Gateway






WHAT IS API GATEWAY?



@gamussa | @thekonghq

A man with dark, wavy hair, wearing a black turtleneck sweater, is shown in profile, looking upwards and to the left. He is standing in a dimly lit room with a brick wall and a staircase with a metal railing visible in the background. The lighting is dramatic, highlighting his face against the darker surroundings.

I want you to be nice...
...until it's time to not be nice

@gamussa | @thekonghq



WHY KONG?

Kong Gateway

Today

- 🌍 most 🥰 API gateway
- Thriving **OSS community**
- 100% API/declarative config driven
- Multi-☁️ and multi-protocol
- 🚀 **performance**
- Rich OOTB plugin ecosystem

The screenshot displays the Kong Gateway website's plugin catalog. On the left is a navigation menu with categories: INTRODUCTION, FILTERS, KONG LICENSE TIERS, FUNCTIONALITY, and CUSTOM PLUGINS. The main content area is a grid of plugin cards. Each card includes an icon, a title, a brief description, and support information (Kong Inc. or Kong Plus). The plugins shown are: ACL, Canary Release, Forward Proxy Advanced, GraphQL Proxy Caching Advanced, OpenID Connect, and Mocking. A timeline at the bottom highlights key features for versions 2.7 (Dec), 2.8 (Mar), 3.0 (Sep), and 3.1 (Dec).

| Version | Key Features |
|-----------|---|
| 2.7 (Dec) | • Secret Management P1 • Consumer Groups • KM OIDC Wizard |
| 2.8 (Mar) | • FIPS-2 • Secret management (Beta) |
| 3.0 (Sep) | • Router optimization • Plugin ordering • Secret manager-GA |
| 3.1 (Dec) | • SAML2 • OAS validation • AppDynamics |

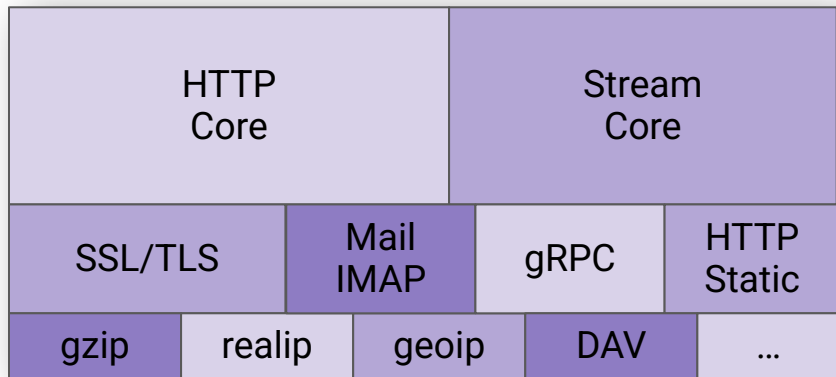
Nginx Architecture

C10K problem

Uses async socket apis (e.g., epoll)

Provides Event-based API for module extensions

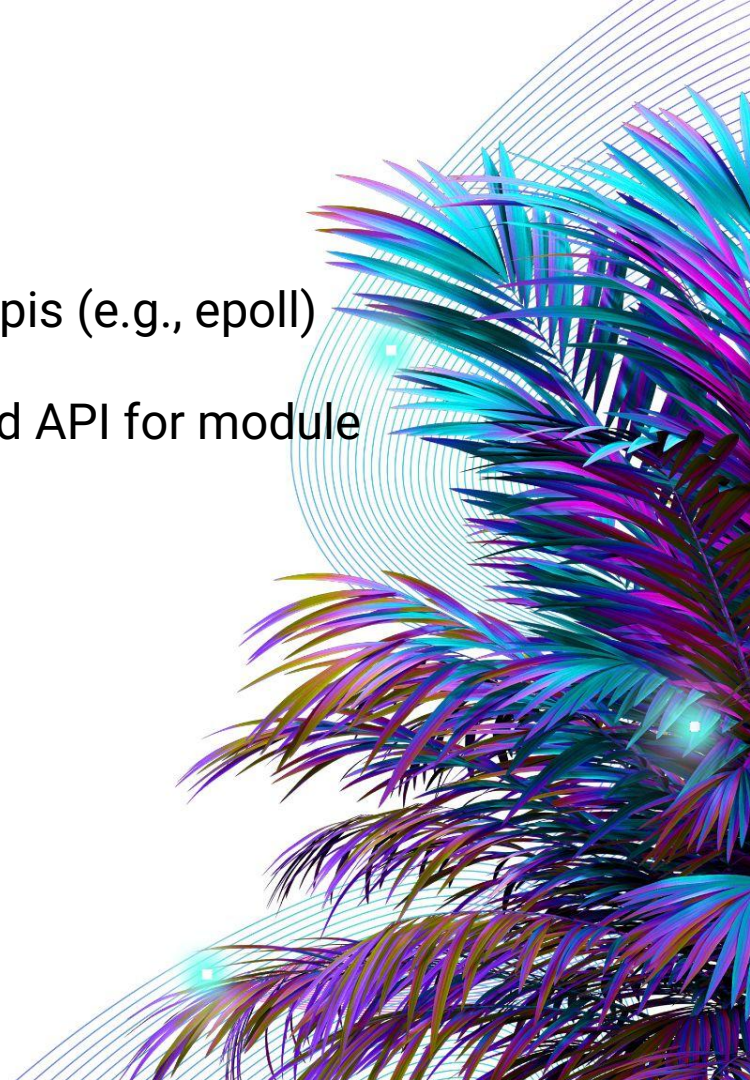
Overview



Phases:

access
content
log

...



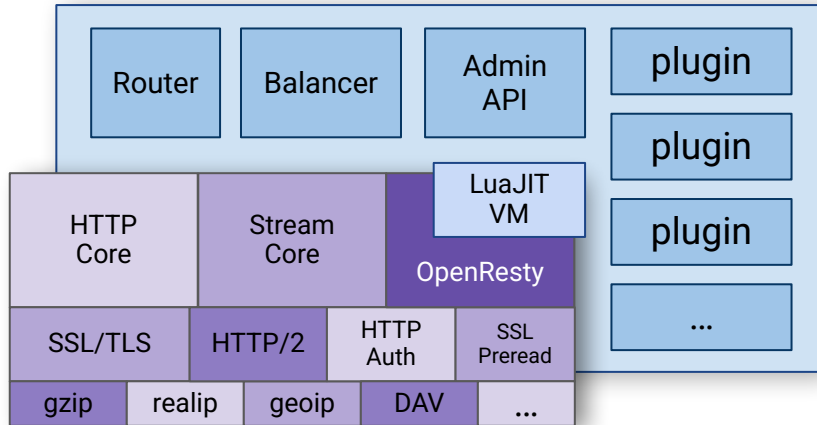
Kong Architecture

Overview

Leverages OpenResty

Runs on LuaJIT

Exposes Nginx more conveniently



Extensibility
in Kong

Plugin Development Kit
(PDK)

Types of plugins and
supported languages

Kong's API for
plugins





WasmX

What is WasmX

An Nginx module for embedding Wasm

Developed by Kong

Runs a Wasm VM inside Nginx

Connects Nginx functionality
to Wasm code

Supports multiple VMs:
Wasmtime, Wasmer, V8

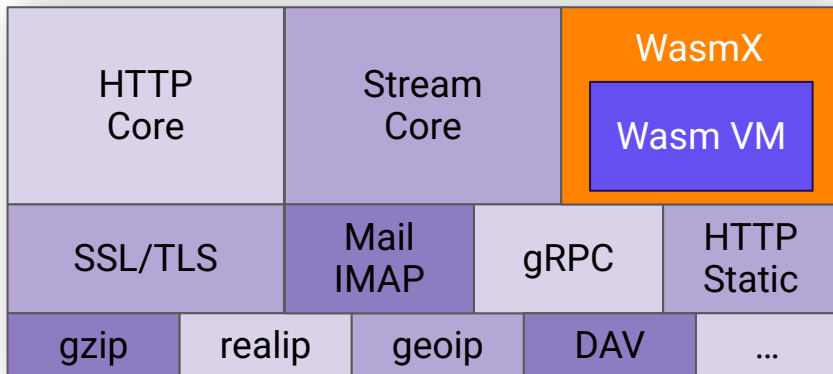


X

A NEW BRICK

How WasmX fits

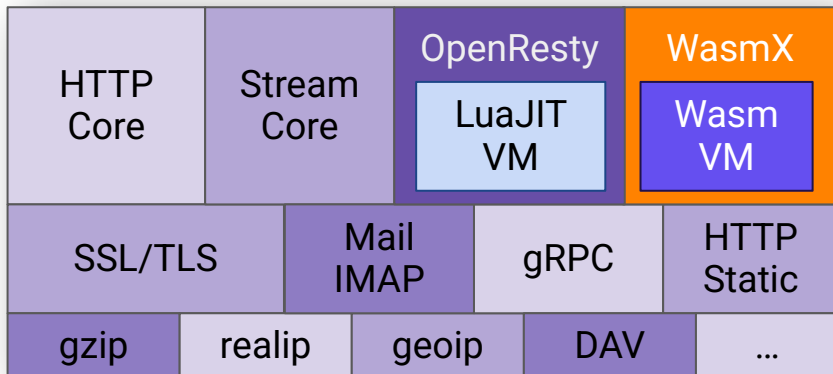
It is compiled into the Nginx binary



A NEW BRICK

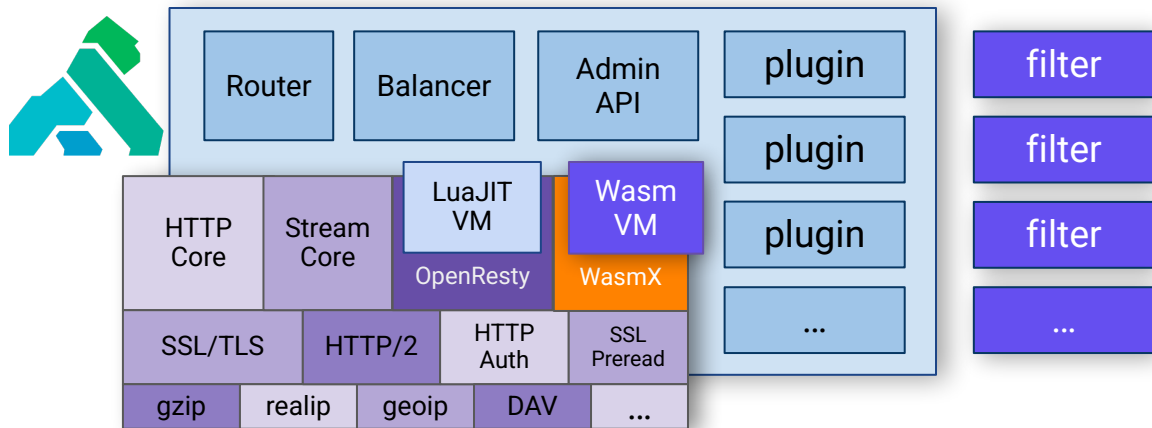
How WasmX fits

(and yes, you can run both!)



Running plugins and filters

In build of Kong including WasmX, you can load Proxy-Wasm filters





**BUT HOW WILL I
IMPLEMENT ALL THESE THINGS?**



THAT'S THE NEAT PART - YOU DON'T

imgflip.com



What is proxy-wasm

Definition and purpose of proxy-wasm

Adoption by Envoy and implementation in WasmX

Language-independent
ABI



What is Proxy-Wasm

A gateway-agnostic API for proxy filters



PW

Language-independent ABI for
implementing proxy APIs (SDKs)
Rust, Go, C++,
AssemblyScript...

An evolving specification

Gateway-independent:
Implemented in Envoy
Being implemented in WasmX

Why *proxy-wasm*

Benefits of using proxy-wasm with WasmX

Interoperability between Kong Gateway and Kuma, Kong Mesh

Support for industry standards





AND NOW...

Demo time!

To recap...

What we've learned

WasmX embeds a Wasm VM

WasmX implements *Proxy-Wasm*

Kong Gateway runs both Wasm
and Lua plugins



Tech Preview Availability

We want your feedback!

<https://incubator.konghq.com>